# MULTIPLE MUONS OF CONVENTIONAL AND EXOTIC ORIGIN IN DUMAND

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## ABSTRACT

We present a first summary of results from a theoretical analysis, based on hadron - muon cascade calculations, that yield relative intensities of very high energy multiple muons originating from ultra high energy interactions initiated by primary protons and iron nuclei in the atmosphere, under consideration of normal as well as direct and exotic production channels. Lateral density distributions and target diagrams will be presented which show that only very large detectors, such as DUMAND, will be able to record multiple muons of conventional origin reliably. This, however, is a prerequisit for any primary mass determination based on multiple muon data.

On the other hand, detection of multiple muons originating from direct and particularly from exotic processes are likely to carry large transverse momenta. Such muons are partly intermixed with muons of conventional origin but tend to spread out in general to much larger distances from the axis of the event, which excludes their detection and identification with smaller installations.

Since all particles in our simulation calculations carry genetic information, such as the generation number of the interaction of their or, in the case of muons, their parent's origin with respect to the first interaction of the primary in the atmosphere, the height of the location of the respective interaction above sea level, and other relevant tags that identify their origin, we are able to carry out detailed studies on multiple muons and their likely origin.